

AN/DSQ-50

The system is used in scoring applications for missile and projectiles 76 mm and larger. The miss distance radar is a pulsed doppler radar which detects these objects within a range of 75 feet from the target antenna. The telemetry transmitter is used to telemeter the information to a ground receiver. The pulse coded modulation telemetry is proposed to operate in the 22000-2290 MHz band using the 1M00F1D emission designator. The system will replace the AN/DSQ-37.

EXPERIMENTAL SERVICE

There are approximately 538 assignments listed in the GMF for equipment operating in the band and in the Experimental Service. Of these assignments, the majority belongs to the Experimental Testing station class (XT) with approximately 446 assignments. This type of station class has been described previously. The rest of the assignments are distributed among the other types of station classes in the Experimental Service. The Experimental Research (XR) with 24 assignments has also been previously discussed. The Experimental Contract Developmental (XC) (49 assignments) and Experimental Developmental (XD) (18 assignments) station classes are for stations used in the evaluation or testing of electronic equipment of systems in a design or developmental stage. The best used station class, the Experimental Composite (XU) with one assignment, represents a composite of two or more experimental categories and is used for experiments in radar cross section and transmission of video data. These assignments have a specified expiration date.

APPENDIX A

ESTIMATED FEDERAL GOVERNMENT'S INVESTMENT FOR FIXED SYSTEMS IN THE 1710-1850 MHz AND 2200-2290 MHz BANDS

The approach used to estimate the total Federal Government's investment for fixed, line-of-sight, point-to-point systems in the 1710-1850 MHz and 2200-2290 MHz bands is based on the following:

- a) The specified cost provided by an agency is used whenever available.
- b) If a cost is not specified, a reasonable cost is derived based on information provided by an agency (e.g., a certain percentage of the total investment is allotted to a specific band).
- c) If the information provided is insufficient to determine an initial cost and an agency's cost per link for a specific band is known, this value is multiplied by the known number of fixed links in the band.
- d) If the cost per link is not known and there is no other available information with regards to an agency's cost investment in a band, a value of \$50,000 per link is multiplied to the agency's total fixed assignments (i.e., FX, FXR, FXE, FXD) in the band to derive an initial cost investment.
- e) When a specific cost estimate is not available, the replacement cost is calculated by multiplying the number of new stations by \$250,000/station and adding the product to the initial cost.

Extracts from some of the Federal Agencies' input response to the NTIA memo, dated December 13, 1989, with regards to the Emerging Telecommunications Technology Act are presented below. This documentation, together with some other sources (e.g., SRV/GMF) were used to derive the total estimated initial and replacement costs of the fixed systems for each agency.

DEPARTMENT OF ENERGY

1710-1850 MHz Band

Current Services Provided

The Department primarily uses this band for cost-effective management and control of power marketing functions. In the near future, a Tracking, Telemetry, and Control (TT&C) downlink for a satellite system is planned. This band is also used to support the nuclear waste management program, site security alarm systems, nuclear weapons test program, and control of robot operations.

Planned Services

Moderate growth in this band is expected due to the continually expanding demand for electrical power. Additionally, a 5-year experimental program is underway to implement a satellite system, ALEXIS, to gather data in support of the U.S. Treaty Verification Program, with a launch scheduled during 1992.

Existing Economic Investment

Current investment is \$49 million.

Alternative Bands

Alternatives are 4400-4990 MHz or 7-8 GHz for the fixed operational microwave services. No alternative band is available for TT&C for ALEXIS.

Projected Cost of Moving

Projections are \$124 million for fixed operational microwave equipment only. If a higher fixed band is used, current estimates are \$.5 million per added repeater site required due to reduced propagation with total cost to be determined. If other alternatives such as fiber optic cable are used, costs to replace the operational microwave radio systems could be in the billions of dollars. An additional \$2 million will be required for ALEXIS.

2200-2290 MHz BAND

Current Services Provided

Several DOE sites use this band for operational telemetry in support of airborne vehicle testing, nuclear event support, data transmissions from dropped vehicles, timing and control weapons testing equipment, and data relay from remote sites to control facilities. Most of these operations are in support of DOD. Also, in the near term, this band will be used for a Telemetry, Tracking & Control (TT&C) uplink for the ALEXIS satellite system.

Planned Services

Continue current operations. Additionally, a 5-year experimental program is underway to implement a satellite system, ALEXIS, to gather data in support of the U.S. Treaty Verification Program with a launch scheduled for 1991.

Existing Economic Investment

Current investment is \$2 million.

Planned Economic Investment

Estimates are \$2.25 million, plus continued costs for operations and maintenance.

Alternative Bands

Some use of the 1427-1530 MHz and 2310-2390 MHz bands may be possible. Once launched, no other Government TT&C band is available.

Projected Cost of Moving

Projections are \$6 million.

DEPARTMENT OF JUSTICE (FEDERAL BUREAU OF INVESTIGATION)

1710-1850 MHz BAND

Service provided - Ancillary devices and fixed links between VHF repeaters, base stations, and control points.

Existing economic Investment - \$2 million for law enforcement ancillary devices; \$43.1 million for fixed microwave stations.

Alternative bands that could be used - The only available spectrum to replace over 700 fixed stations presently operating in this band is the 7125-8500 MHz band. Due to the propagation characteristics of the 7/8 GHz band, additional relay points are necessary. The replacement cost of present equipment alone is conservatively estimated to be \$35 million (\$50,000/site x 700). Assuming land is available, and based upon the projection that 25% of the existing facilities will require one or more intermediate relay stations, over 175 new stations must be designed. Land acquisition, facility construction, and equipment procurement costs for these new stations are estimated to be over \$43,750 million (\$250,000/site x 175).

Changing the current operational frequencies of these ancillary devices to other bands would require a minimum of five years at a cost of \$42.5 million. These particular law enforcement ancillary devices are basically designed for use under adverse conditions. Required response times and the need for clandestine installation preclude the use of such techniques as fiber optic or coaxial cables. The unprogrammed and unnecessary cost for a reaccommodation in this band is \$81.25 million for the FBI alone.

United States Postal Service

The current investment in radio communications equipment is estimated at \$45-\$50 million dollars. The primary bands allocated by the Interdepartment Radio Advisory Committee (IRAC) and currently in use by the U.S. Postal Service include: (1) UHF 406-420 MHz; (2) VHF 162-174 MHz; and (3) 1800 MHz. Our investment in these bands is estimated to be: (1) UHF - 65 percent; (2) VHF - 34 percent; and (3) 1800 MHz - 1 per cent.

DEPARTMENT OF INTERIOR

1700-1850 and 2200-2290 MHz Bands

Current Services Provided and Mission Supported

Fixed Point-to-Point: DOI microwave systems are primarily designed to facilitate interconnection of lo-band, VHF and UHF land mobile radio networks, typically installed on higher elevation sites to increase coverage. The medium capacity links (24-96 channel) generally interconnect multiple facilities, while the low density (12-24 channel) microwave paths are for feeder links from offices in smaller towns and cities. When seasonal personnel are not manning remote offices, these back-bone microwave links are usually configured to tie the land mobile networks back to a full-time, centralized, dispatch center.

Planned Services

Fixed Point-to-Point: Trends indicate the growth of low and medium density microwave to continue at 4-5 percent annually. Earlier projections of 5-10 percent did not take into account access to the 932/941 MHz bands.

Existing Economic Investment

Fixed Point-to-Point: The Department of the Interior has approximately 400 fixed stations operating between 1.7-2.29 GHz. The present value of installed equipment is conservatively estimated to be \$20 million (\$50,000/site x 400 sites).

Planned Economic Investment

Fixed Point-to-Point: Growth of new microwave radio systems is expected to stabilize at five percent annually. For purposes of this report, the cost of a new system is considered to average \$100,000. The actual cost may be between \$50,000 and \$250,000 depending upon whether an existing site is used, or new site development is required. Accordingly, annual growth is projected to be \$2 million (\$100,000 each x 20 sites/year).

Alternative Bands that could be Used

Fixed Point-to-Point: Some "thin route" links, i.e., 12 or less channels, could be accommodated in 932/941 MHz or 1427-1435 MHz bands. Most DOI microwave in these bands support 24 or more channels. However, since very few DOI microwave systems will require more than 96 channels, use of frequencies above 5 GHz, e.g., 7/8 GHz, is not spectrally efficient. Use of spectrum above 20 GHz for fixed operations is further complicated by atmospheric absorption of millimeter waves by water or oxygen molecules.

Projected Costs of Moving Operations

Fixed Point-to-Point: The replacement cost of present equipment alone is \$20 million (\$50,000/site x 400). However, since sufficient spectrum for the replacement of Federal Government networks is unavailable below 7/8 GHz, additional relay points are necessary. Assuming land is available, and based on the projection that 25% of the existing facilities will require one or more intermediate relay stations, 100 new stations must be designed from the ground up. Land acquisition, facility construction and equipment procurement costs for 100 new stations are estimated to be \$25 million (\$250,000/site x 100). The cost to relocate existing microwave is \$45 million.

DEPARTMENT OF AGRICULTURE

1.7-1.8 GHz Band

Current Services Provided and Mission Supported

The primary USDA user of this band is the Forest Service with microwave backbone systems supporting land-mobile communications systems, voice telephone systems, and data communications systems on most of the national forests.

Planned Services

Planned services are oriented toward expansion of the backbone systems and will (in many cases) replace fixed facilities now in the 406-420 band.

Existing Economic Investment

The combined investment of all USDA agencies having radio systems installed in this band includes over 1200 stations at an investment of over \$36,000,000.

Planned Economic Investment

It is hard to forecast the USDA direction in this band because of several outside factors. Most of these factors have already been covered in previous paragraphs talking about the availability of the 900 MHz band. If there are no major changes in band availability, we estimate the growth to be between \$1 - 2 Million per year.

Alternative Bands That Could Be Used

As was mentioned previously, the 900 MHz band (if assignments become available) could offset some use of this band. The 7 GHz bands would also be a reasonable (but more costly) alternative.

Projected Costs of Moving Operations

Costs of moving to an alternative band would be at least that of the original investment since equipment and labor is steadily increasing and all equipment would have to be replaced. We estimate a move from this band would cost between \$30 and 440 million.

FEDERAL AVIATION ADMINISTRATION (FAA)

The services provided by the FAA promote aviation safety and efficiency for the private sector, military, and other government agencies. Under Congressional mandate, the FAA has embarked on a multi-billion dollar upgrade of the National Airspace System (NAS) in order to assure the continued safety and efficiency of the NAS. This upgrade requires additional spectrum dependent systems to handle the increased traffic loads and system functional improvements.

The 1710-1850 MHz supports the land point-to-point communication requirements for aviation. The FAA investment in the 1710-1850 MHz band is 350 million and 1 million in the 2200-2290 MHz band.

APPENDIX B

**COORDINATION CONTOUR FOR TRANSMITTING EARTH STATIONS
IN THE 1761-1842 MHz BAND**

Location: Anderson AFB, Guam.
Coordinates: 13 30 48 N; 151 01 19 E.
Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
Elevation Angle: 10°.

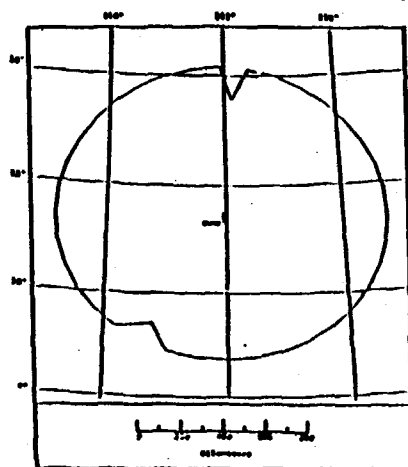


Figure B-1. Coordination contour for the Anderson AFB, Guam Transmitting Earth Station.

Location: Kaena Pt.
Coordinates: 21 24 18 N; 159 38 34 W.
Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
Elevation Angle: 10°.

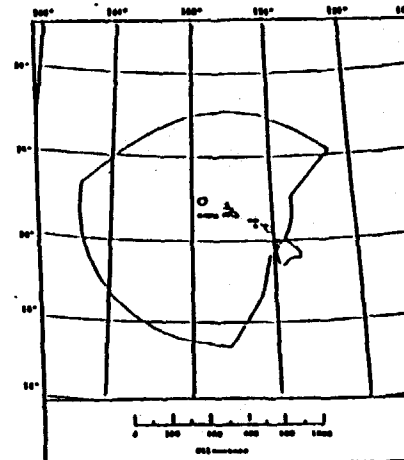


Figure B-2. Coordination contour for the Kaena Pt., Hawaii Transmitting Earth Station.

Location: New Boston.
Coordinates: 42 56 44 N; 71 38 34 W.
Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
Elevation Angle: 10°.

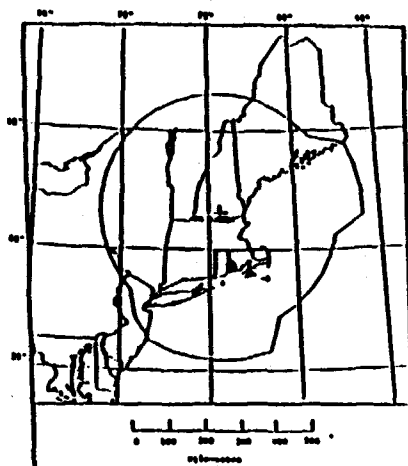


Figure B-3. Coordination contour for the New Boston, New Hampshire Transmitting Earth Station.

Location: Vandenberg.
Coordinates: 34 40 34 N; 120 34 04 W.
Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
Elevation Angle: 10°.

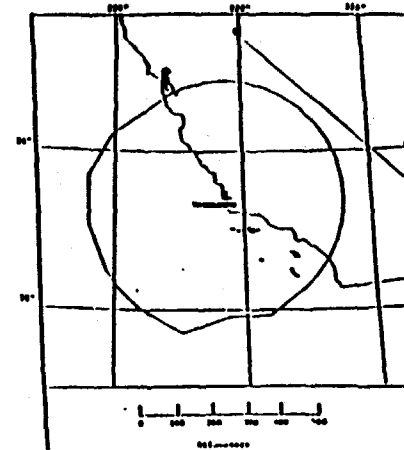


Figure B-4. Coordination contour for the Vandenberg AFB, California Transmitting Earth Station.

APPENDIX C

COORDINATION CONTOUR FOR RECEIVING EARTH STATIONS IN THE 1761-1842 MHz BAND

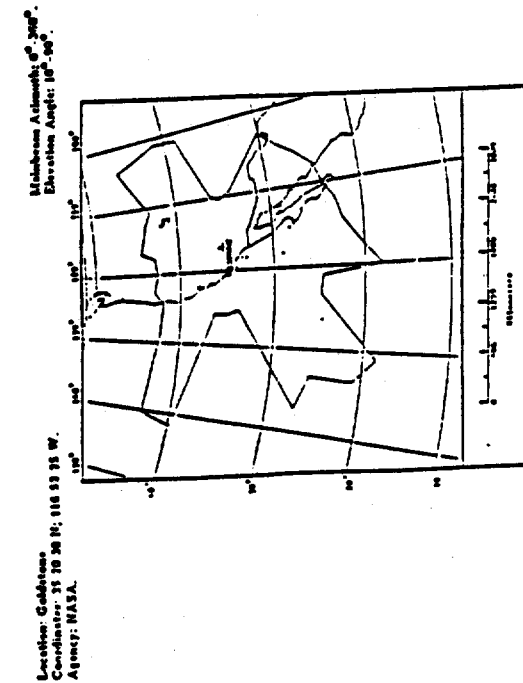


Figure C-1. Coordination contour for the Goldstone, California Receiving Earth Station.

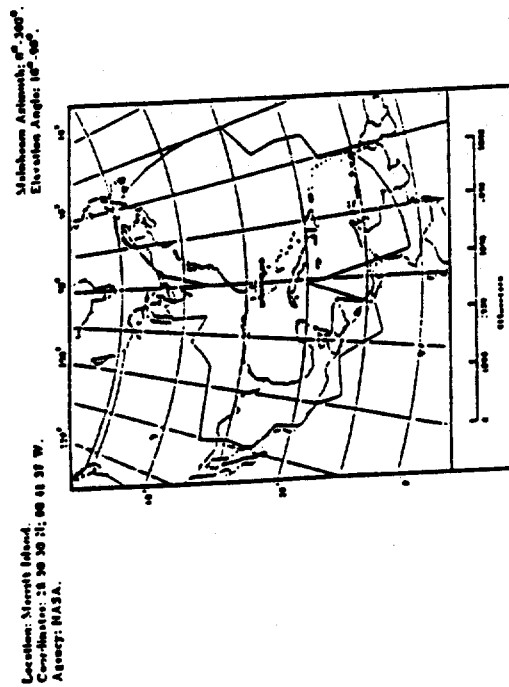


Figure C-3. Coordination contour for the Merritt Island, Florida Receiving Earth Station.

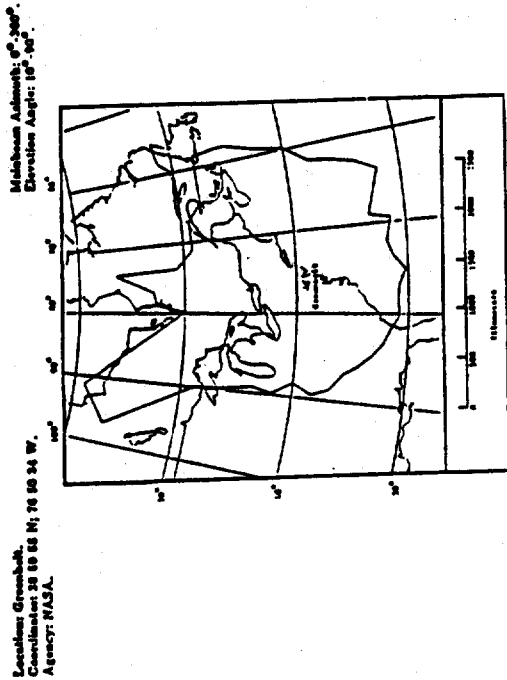


Figure C-2. Coordination contour for the Greenbelt, Maryland Receiving Earth Station.

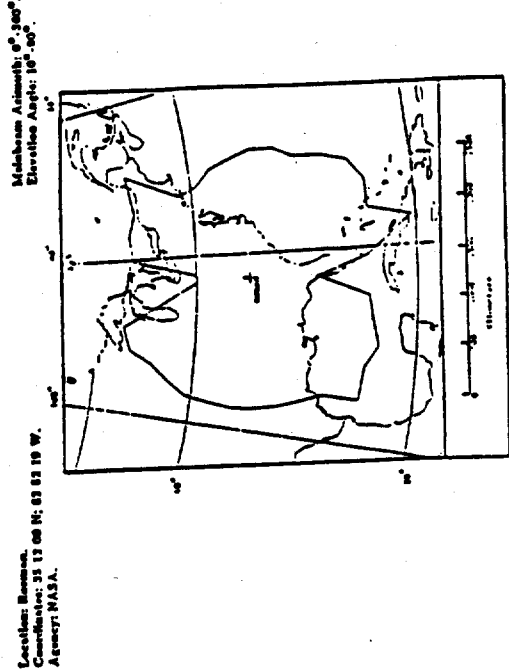


Figure C-4. Coordination contour for the Rosman, North Carolina Receiving Earth Station.

Location: Fairbanks.
Coordinates: 64 58 38 N; 147 30 54 W.
Agency: NASA.

Mainbeam Azimuth: 0°-360°.
Elevation Angle: 10°-90°.

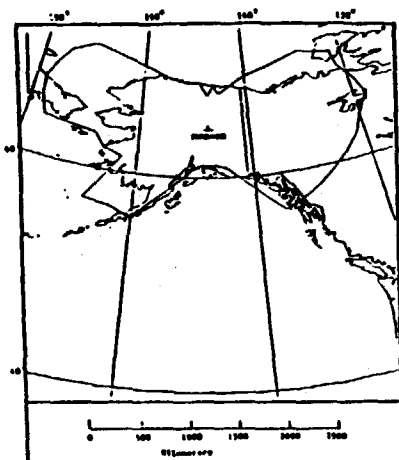


Figure C-5. Coordination contour for the Fairbanks, Alaska Receiving Earth Station.

Location: Shirley Bay, Ontario.
Coordinates: 45 30 54 N; 75 53 22 W.
Agency: Canada.

Mainbeam Azimuth: 330°.
Elevation Angle: 24.5°.

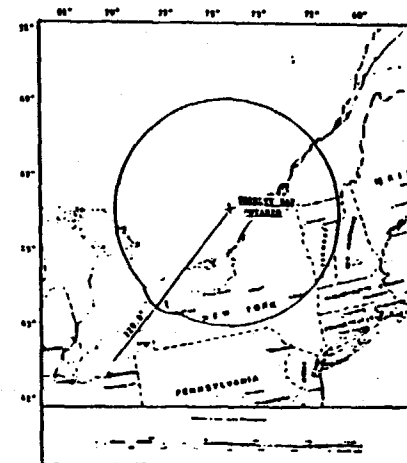


Figure C-6. Coordination contour for the Shirley Bay, Ontario Receiving Earth Station.

Location: Anderson AFB, Guam.
Coordinates: 13 29 48 N; 144 51 12 E.
Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
Elevation Angle: 10°.

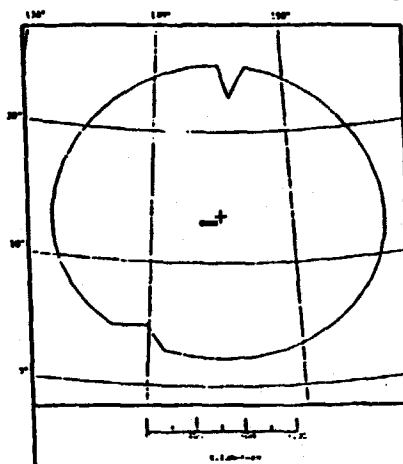


Figure C-7. Coordination contour for the Anderson AFB, Guam Receiving Earth Station.

Location: Kaena Pt.
Coordinates: 21 34 18 N; 159 10 34 W.
Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
Elevation Angle: 10°.

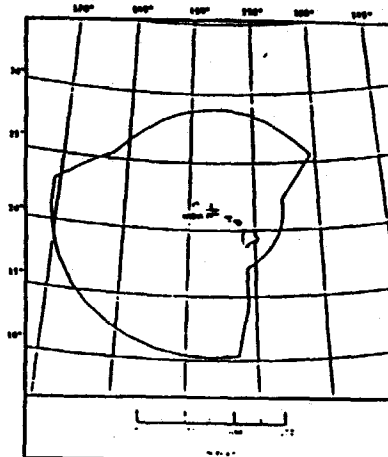


Figure C-8. Coordination contour for the Kaena Pt., Hawaii Receiving Earth Station.

Location: New Boston.
 Coordinates: 43 54 34 N; 71 36 24 W.
 Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
 Elevation Angle: 10°.

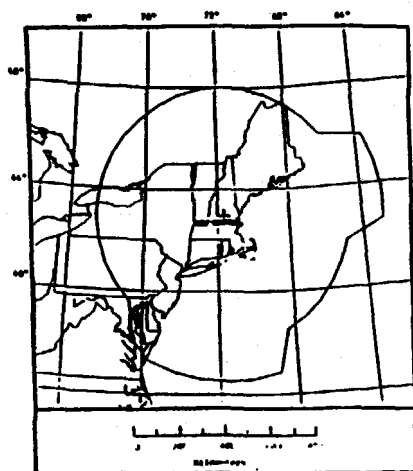


Figure C-9. Coordination contour for the New Boston, New Hampshire Receiving Earth Station.

Location: Vandenberg.
 Coordinates: 34 29 34 N; 120 51 54 W.
 Agency: Air Force.

Mainbeam Azimuth: 0°-360°.
 Elevation Angle: 10°.

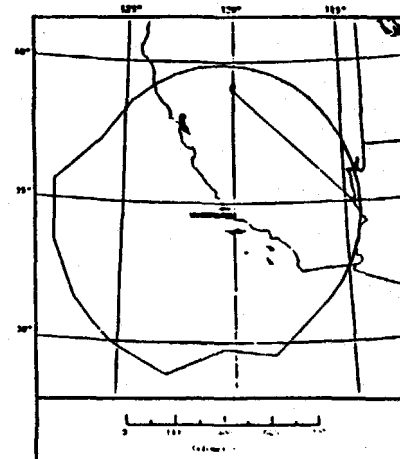


Figure C-10. Coordination contour for the Vandenberg AFB, California Receiving Earth Station.

Location: Goldstone.
 Coordinates: 35 25 29 N; 116 53 24 W.
 Agency: NASA.

Mainbeam Azimuth: 0°-360°.
 Elevation Angle: 10° minimum.

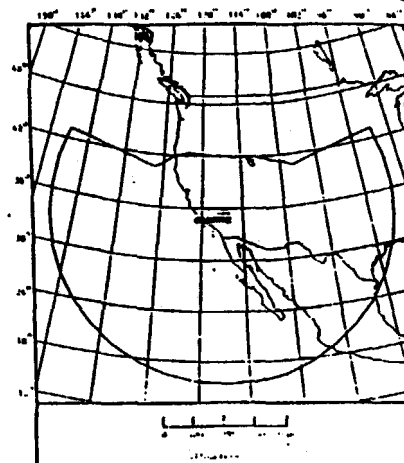


Figure C-11. Coordination contour for the Goldstone, California Receiving Earth Station.

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14. SUPPLEMENTARY NOTES			
15. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.) This Spectrum Resource Assessment (SRA) is an integral part of the National Telecommunications and Information Administration (NTIA), Office of Spectrum Management (OSM) long-range planning process related to national and international interests that focus on radio frequency spectrum topics. The SRA includes a description of the current Federal Government spectrum use of the 1710-1850 MHz and 2200-2290 MHz bands and an estimate of the Federal Government investments in these bands. Specifically, the SRA provides updated information on allocations, technical standards, frequency assignments, channeling plans and spectrum usage of the 1710-1850 MHz and 2200-2290 MHz bands. It also includes updated information on major systems currently operating or planned for operation in these bands and their technical or operational characteristics. Note, however, that pertinent information related to the Government spectrum use and investment included in this report are based solely on <u>unclassified frequency assignments or systems</u> authorized for use in these bands.			
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